ABSTRACT

An electroplating bath, a system, a process for, and the article obtained from, depositing a zinc-nickel ternary or higher alloy, a) zinc ions; b) nickel ions; and c) one or more ionic species selected from ions of Te^{+4}, Bi^{+3} and Sb^{+3}, and in some embodiments, further including one or more additional ionic species selected from ions of Bi^{+3}, Sb^{+3}, Ag^{+1}, Cd^{+2}, Co^{+2}, Cr^{+3}, Cu^{+2}, Fe^{+2}, In^{+3}, Mn^{+2}, Mo^{+6}, P^{+3}, Sn^{+2} and W^{+6}. In some embodiments, the system includes a divider forming a cathodic chamber and an anodic chamber, with the electroplating bath in the cathodic chamber only. In various embodiments, the zinc-nickel ternary and higher alloys may provide improved properties to the conductive substrates upon which the alloys are deposited.